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Communicating Longevity risk to Life Boards

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Presentation outline

- Challenges in communicating future improvements (Mark)
- Analysis by cause of death (Dave)
- Enhanced communications (Mark)

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Challenges in communicating future improvements

Scene Setting

- Differing levels of expertise and time between working level risk committees and board level risk committees
- Mortality improvement projection methodology can become quite technical and unintuitive
- CMI model construction robust but difficult to explain to non-technicals
- Is there a more intuitive way of looking at improvements in a currency non-technicals can form a more informed view on best estimate assumptions?

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Example of Technicality: Explaining reserve moves driven by CMI model updates

There are a number of stages involved in updating the CMI model which introduce moves in reserves and have different impacts by age, e.g.:

- Revised Census Data (if applicable)
- Roll Forward Model: Rebase start year & set short term model assumptions consistent with projections
- Experience Variance and Model Refitting: Re-smoothed historic data plus an additional year of actual realised data
- Extension: Setting convergence parameters to default assumptions delays the year in which the Long-Term Rate is reached by 1 year.

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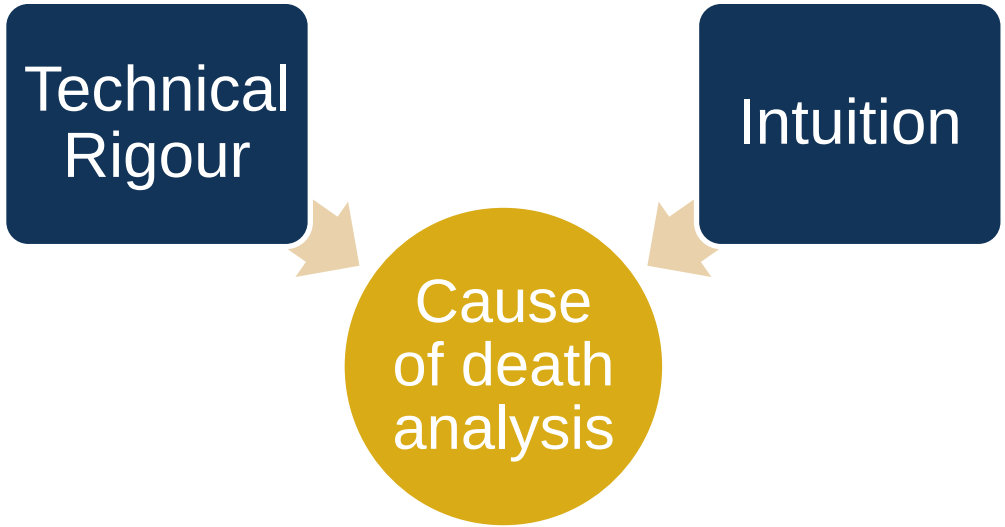
Bringing technical and intuition together

- Use of recent improvement data capturing age / year shape
- Short Term Extrapolation
- Convergence to Long Term Trend



- Personal contact with Cancer / Heart Disease
- Views on austerity / economic outlook
- Behavioural Changes

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Cause of death analysis

Overview of analysis

- Simple model provides the starting point – extrapolating by cause from recent past
- Seek understanding of what has driven recent changes
- And how the drivers of future change may differ
- Re-combine by cause projections to gain an alternative view of all-causes mortality.

Data

- ONS data:
  - Death registrations in E&W by gender, age group & cause of death
  - Mid-year population estimates
- Analysis primarily based on 1993-2012 (2013 now available)
- Data discontinuities:
  - 2001 – adoption of ICD-10 (previously ICD-9)
  - 2011 – revisions to ICD-10
- Accuracy of recording of cause of death
- 1919 cohort.

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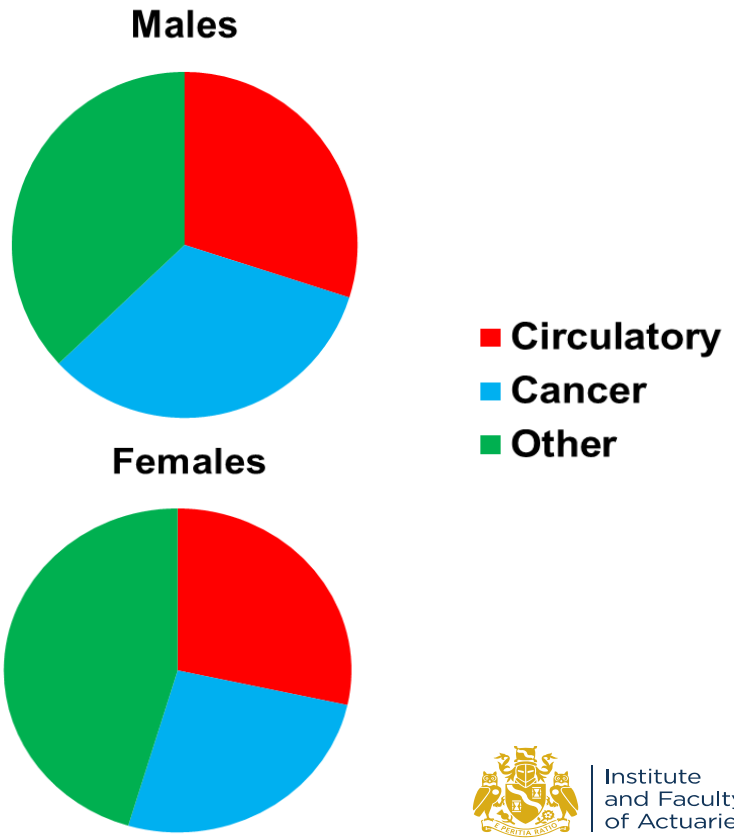
Broad cause groups

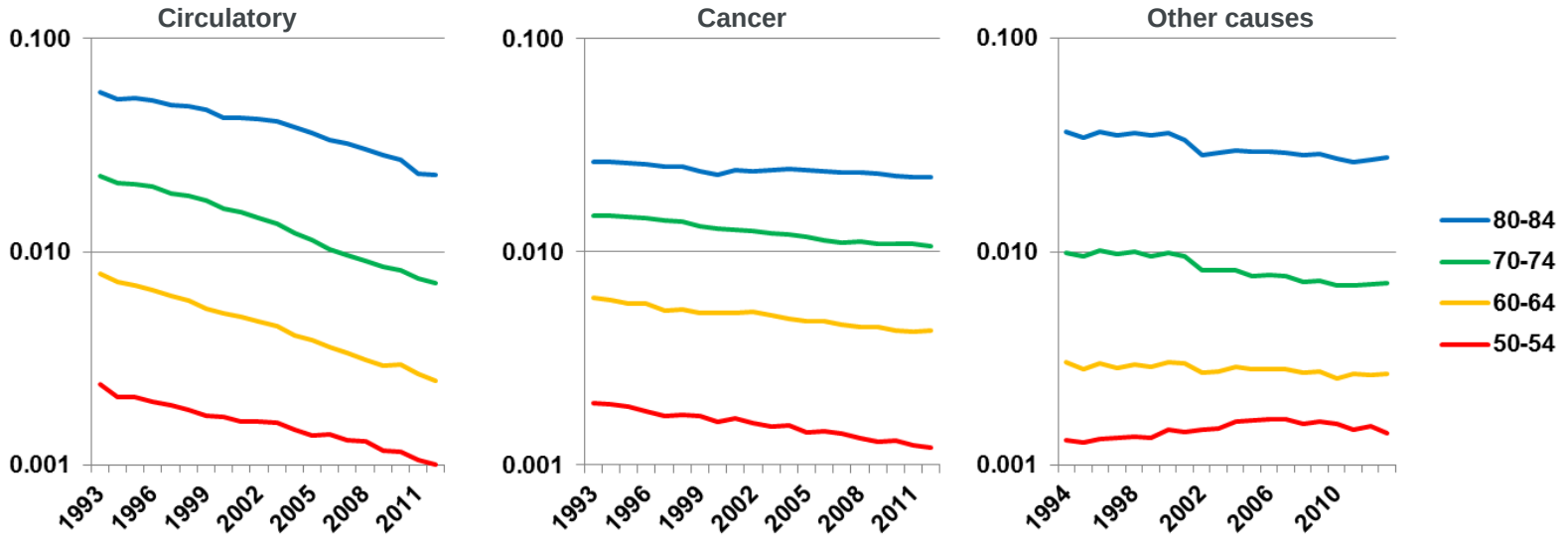
- Analysis presented for 3 broad cause groups
- Approx. equal split of deaths in each
- Heterogeneity within each cause increases considerably from circulatory -> cancer -> other
- Need to delve further to understand drivers and trends.

Proportion of deaths in 2012 at ages 50+ by broad cause group



Crude mortality rates by cause

Crude mortality rates by broad cause group, males *NB Charts use a log scale*



- **Circulatory mortality has fallen rapidly**
- **Cancer mortality has improved steadily**
- **Other causes is more erratic**

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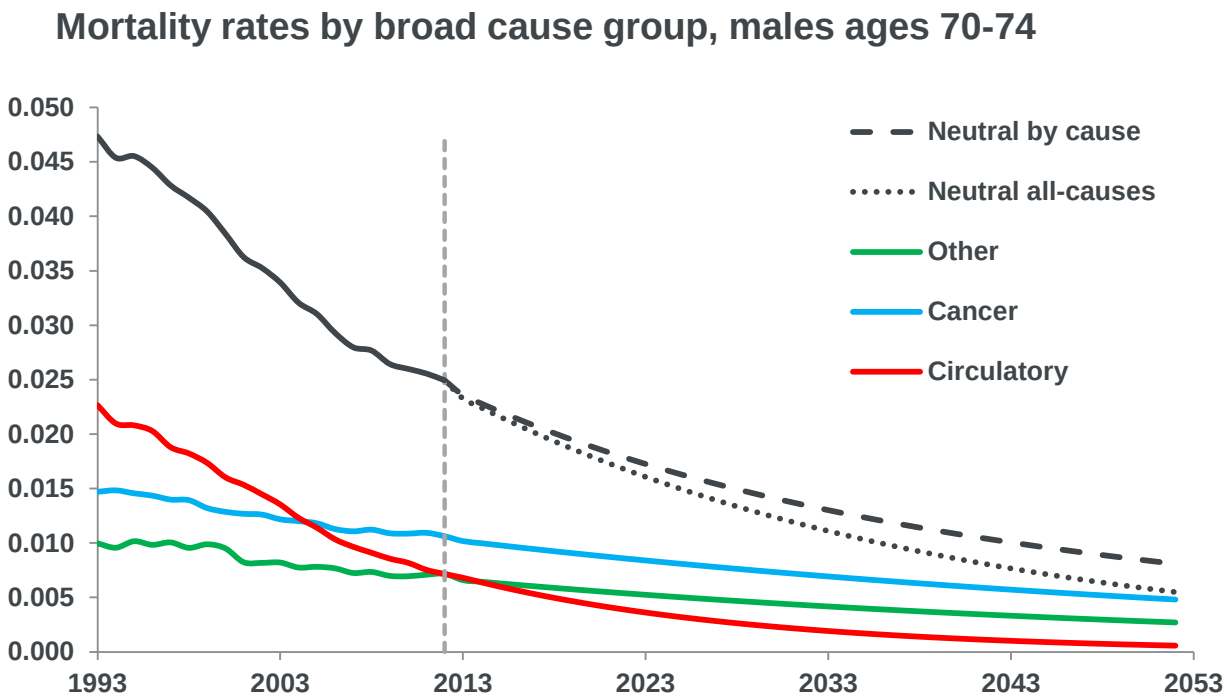
A simple extrapolation of mortality by cause



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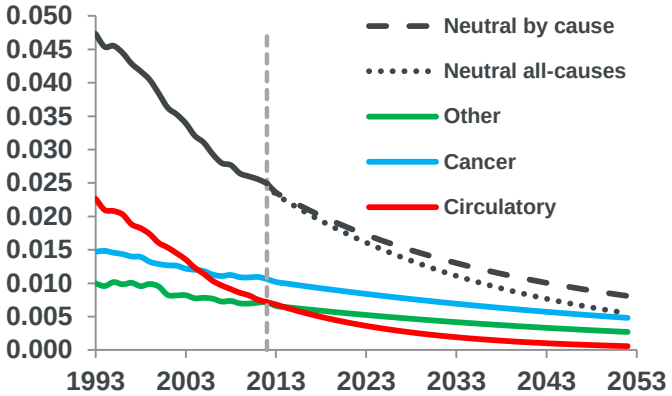
A simple projection of mortality by cause

For males ages 70-74

- Circulatory mortality has fallen rapidly, around 6% p.a.
- Cancer mortality has improved steadily, but less than 2% p.a.
- Other causes erratic but just over 2% p.a.
- Cancer is now the leading cause

The sum of the projections by cause results in lower improvements than projecting all-causes mortality



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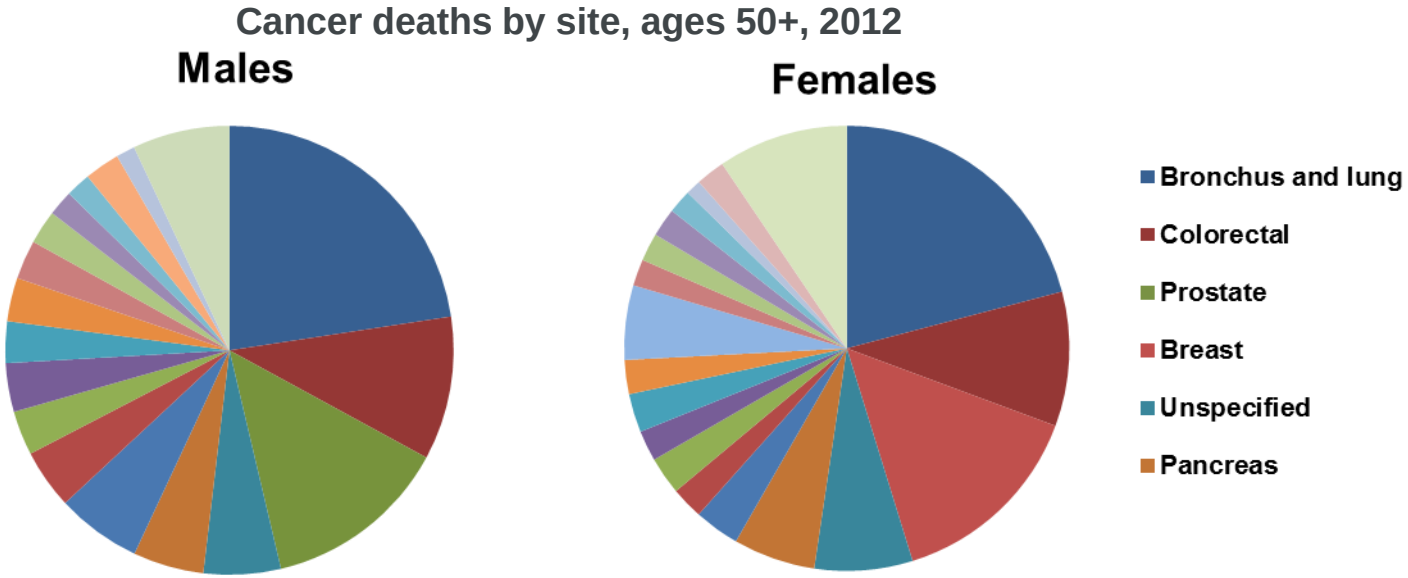
Cancer: a variety of sub-causes



- Bronchus and colorectal are 1st and 2nd causes of death for both genders
- Prostate / breast rank 3rd for males / females
- But these 3 account for less than half of all cancers.

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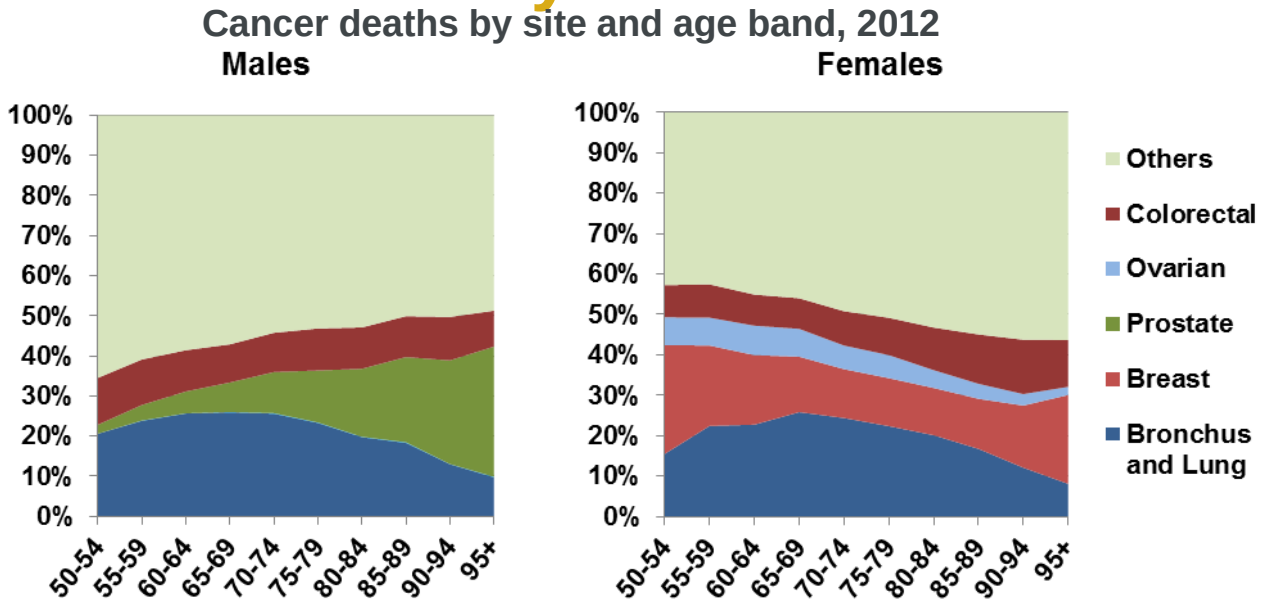
Cancer: a variety of sub-causes



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Cancer: Underlying drivers

- Prevalence depends on:
  - Lifestyle factors (smoking, obesity, diet, childbirth, breast-feeding)
  - Occupational exposures (e.g. asbestos)
  - Genetics
- Detection depends on:
  - Medical developments (the ability to detect a cancer)
  - Changes in medical practice, e.g. screening
  - Public awareness
- Post-diagnosis survival – slow development and implementation.

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Cancer: Future differences

- Prevalence:
  - Smoking is the dominant lifestyle factor – lower improvements in future from past changes in prevalence
- Screening:
  - Breast/cervical in place for many years => lower improvements in future
  - Colorectal screening introduced in 2007 – improvements yet to emerge
- Post-diagnosis survival – no changes modelled.

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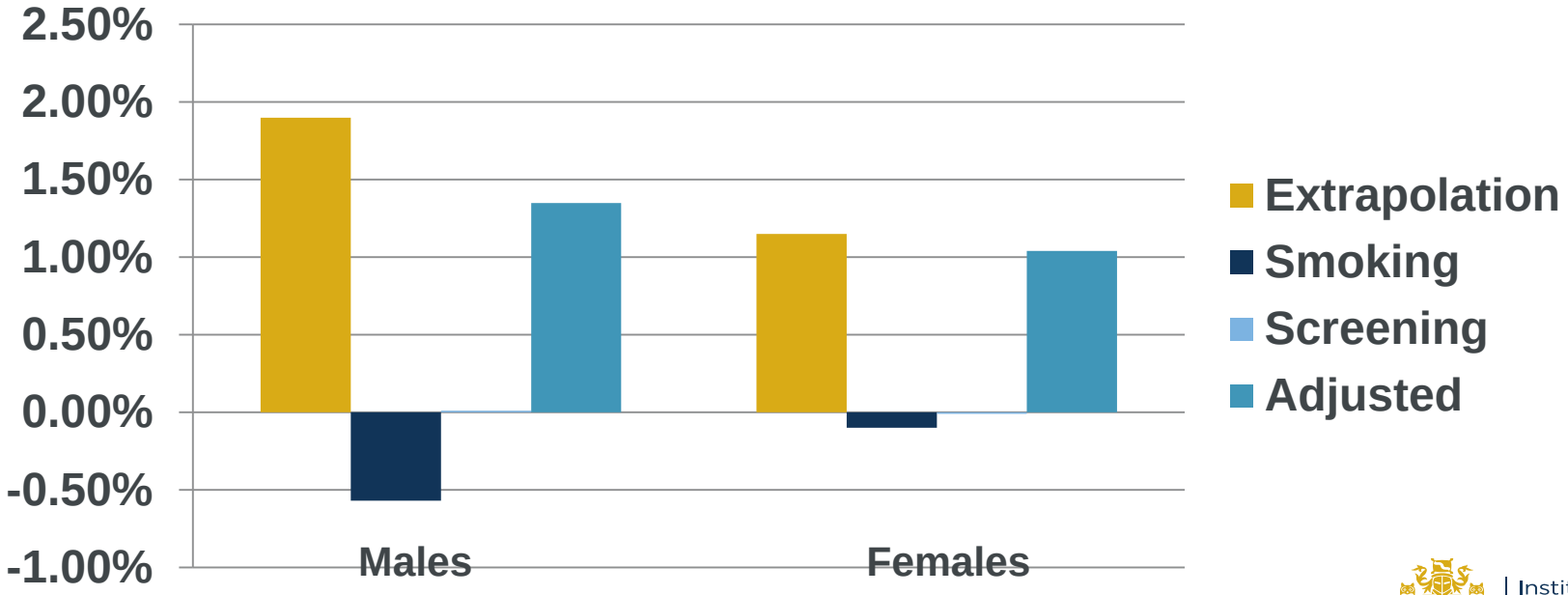
Cancer: Future differences

Impact of adjustments on improvements in 2025; ages 70-74



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Enhanced communications

Adding “real world” adjustments

Circulatory

Smoking

Adjusted Circulatory Rates of improvement

Cancer

Smoking
Breast / Prostate
Colorectal

Adjusted Cancer Rates of improvement

Other Causes

Smoking

Adjusted Other Rates of improvement

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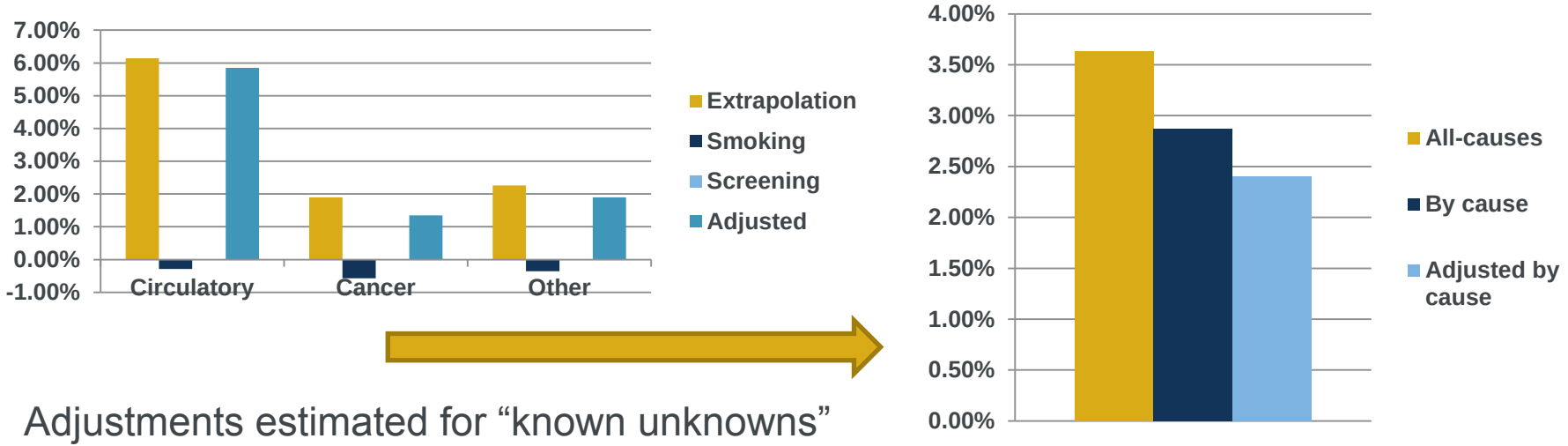
Drawing cause of death projections together

Impact of adjustments on improvements in 2025; males ages 70-74



- Adjustments estimated for “known unknowns”
- Adjustments dominated by allowance for reduction to improvement rates from changes in smoking prevalence
- No allowance for “unknown unknowns” which should be borne in mind.

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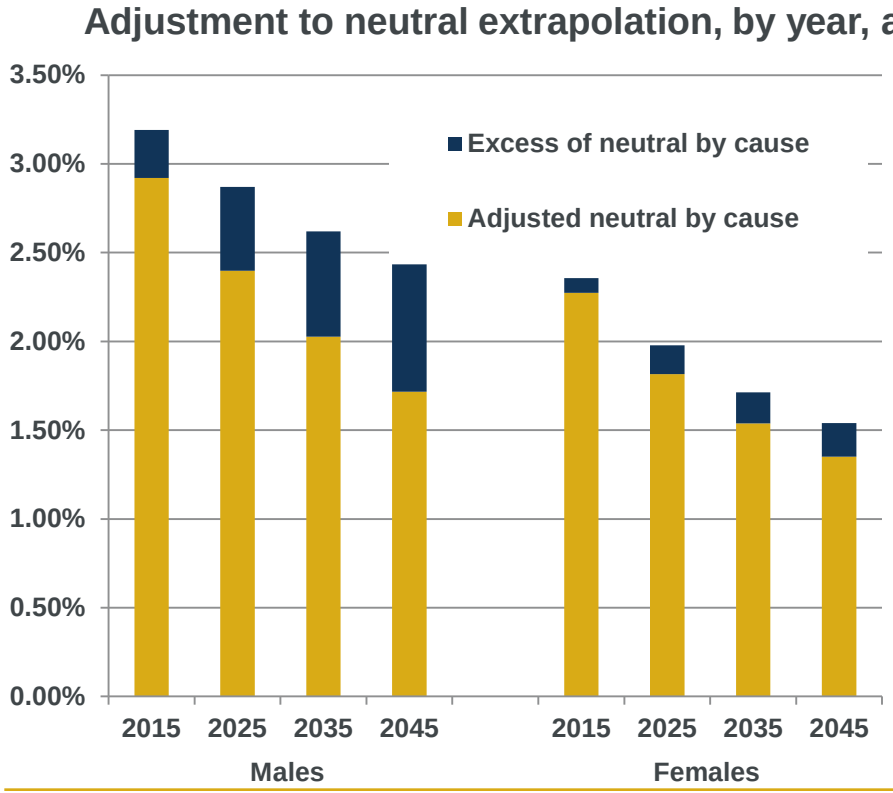
Summary of adjustments



- Impact of adjustments by calendar year
- Impact on older ages higher than younger
- Impact increasing over time in line with adjustments

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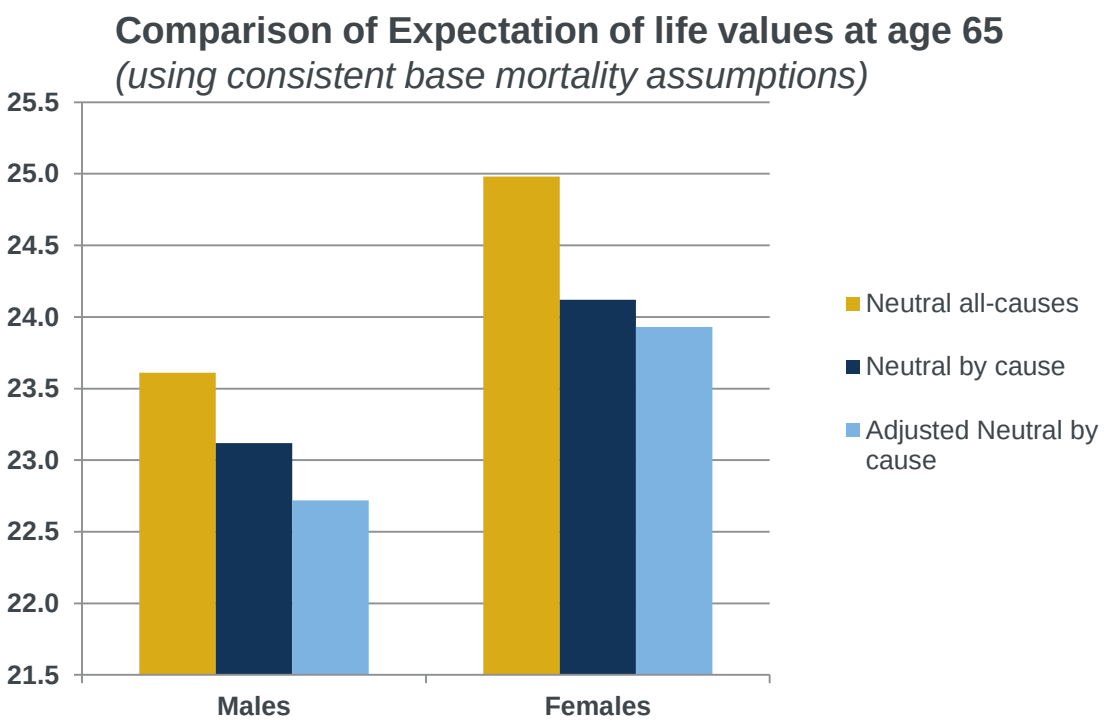
Results



- Can compare results with internal best estimate assumptions
- Quantify by cause effect and adjustments
- Express results allowing for CMI model initial improvements.

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Board Response to project

- Helpful to quantify improvements with a “Real world” feel
- Although modelling was simplified and had limitations, model was better understood / appreciated vs more complicated approach
- Possible to answer questions like:
  - What is the annual improvement in “circulatory disease” which would be required to goal seek RL best estimate / prudent margins?
  - What does a “cure for cancer” mean in terms of overall impact on improvements?

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Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

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